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10/588,755	08/08/2006	Ilan Ben-David	P-6519-US	2787

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EXAMINER
SPAR, ILANA L

ART UNIT	PAPER NUMBER
2629	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/588,755	BEN-DAVID ET AL.	
	Examiner	Art Unit	
	ILANA SPAR	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,6,7,9-18,22,23,25-30,32,36 and 38-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6,7,9-18,22,23,25-30,32,36,38-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The following Office Action is responsive to the amendments and remarks received on May 13, 2011.

Claim Objections

2. Claims 1 and 17 are objected to because of the following informalities: Claims 1 and 17 have been amended to further clarify that the converted sub-pixel data depends on the position of the pixel displaying the particular data, "thereby allowing the same intermediate sub-pixel data to be converted to different converted sub-pixel data depending on the position of the pixel displaying the data." This language is confusing, as it is clear that the same sub-pixel data (i.e. the data intended for a particular sub-pixel) cannot be applied to more than one sub-pixel in more than one location, and therefore the same sub-pixel data cannot be converted to two different sub-pixel data values to be applied to two different regions of the display. Examiner understands from the claim language that if, for example, two sub-pixels had the same intermediate value but were located in different regions of the display, they would have different converted sub-pixel values; however, this is not clear from the newly amended claim limitation. Examiner suggests either removing or clarifying the above-quoted limitation. Appropriate correction is required.

3. Claim 11 is objected to because of the following informalities: Claim 11 teaches "said driver signals" without providing proper antecedent basis for this term. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 10, 13, 14, 17, 26, 28, and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Murdoch et al. (US Patent No. 6,897,876).

With reference to claim 1, Murdoch et al. teaches a color display device for displaying a more-than-three color image, the device comprising a driver control module to controllably activate one or more drivers of an array of sub-pixel elements of at least four different colors based on image data representing pixels of said color image in terms of at least three data components wherein said driver control module comprises:

a conversion module for converting said image data into converted sub-pixel data representing said color image in terms of four or more primary colors (see column 11, lines 11-17) said conversion module comprises:

a first converter for converting said image data into intermediate sub-pixel data of four or more primary colors (see column 11, lines 11-17), and

a second converter for converting said intermediate sub-pixel data into said converted sub-pixel data using at least one conversion matrix, wherein the converted sub-pixel data depends on the intermediate sub-pixel data and a position of

the pixel displaying the data, thereby allowing the same intermediate sub-pixel data to be converted to different converted sub-pixel data depending on the position of the pixel displaying the data, wherein data for each of said four or more primary colors of said converted sub-pixel data is in gray-level format (see column 11, lines 17-32 and column 6, line 25 to column 7, line 40), and

a controller to control said conversion module to convert said image data into said converted sub-pixel data based on said one more display-attributes and said one or more image-attributes, wherein said controller is able to determine one or more values of said at least one conversion matrix based on at least one display attribute related to said display device and at least one image attribute related to said color image, and to provide said values of said at least one conversion matrix to said second converter (see column 11, lines 11-32).

Murdoch et al. fails to explicitly teach the structures used to carry out the method of data conversion, but inherently teaches a conversion module which carries out the described conversion, and also a controller, which is well known in the art as being used to control data generating and driving circuitry.

With reference to claim 10, Murdoch et al. teaches all that is required with reference to claim 1, and further teaches that said driver control module comprises a sub-pixel processor to process said converted sub-pixel data, wherein said controller is able to control said processor to generate a sub-pixel signal based on at least one of said image attributes and said display attributes (see column 11, lines 11-32 – it is

inherently known that processors are used to carry out data processing functions, such that Murdoch would inherently comprise a sub-pixel processor).

With reference to claim 13, Murdoch et al. teaches all that is required with reference to claim 1, and further teaches that said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see column 11, lines 23-32 – the spatial arrangement of the sub-pixels must be compensated for to eliminate brightness or color non-homogeneity).

With reference to claim 14, Murdoch et al. teaches all that is required with reference to claim 1, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see column 11, lines 17-22 – the intensities of the sub-pixels must be adjusted to create a uniform brightness and color).

With reference to claim 17, Murdoch et al. teaches a method of displaying a more-than-three color image comprising controllably activating one or more drivers of an array of sub-pixel elements of at least four different colors, based on image data representing pixels of said color image in terms of at least three data components, said one or more drivers to perform:

determining values of at least one conversion matrix based on at least one display attribute related to said display device and at least one image attribute related to said color image (see column 11, lines 17-32 and column 6, line 25 to column 7, line 40);

converting said image data into intermediate sub-pixel data of four or more primary colors (see column 11, lines 11-17); and

using said determined values of at least one conversion matrix to convert said intermediate sub-pixel data into converted sub-pixel data, said converted sub-pixel data representing said color image in terms of four or more primary colors, wherein data for each of said four or more primary colors of said converted sub-pixel data is in gray-level format, wherein the converted sub-pixel data depends on the intermediate sub-pixel data and a position of the pixel displaying the data, thereby allowing the same intermediate sub-pixel data to be converted to different converted sub-pixel data depending on the position of the pixel displaying the data (see column 11, lines 17-32 and column 6, line 25 to column 7, line 40).

With reference to claim 26, Murdoch et al. teaches all that is required with reference to claim 17, and further teaches processing said converted sub-pixel data and generating a sub-pixel signal based on at least one of said image attributes and said display attributes (see column 11, lines 11-32).

With reference to claim 28, Murdoch et al. teaches all that is required with reference to claim 18, and further teaches that said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of

one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see column 11, lines 23-32 – the spatial arrangement of the sub-pixels must be compensated for to eliminate brightness or color non-homogeneity).

With reference to claim 29, Murdoch et al. teaches all that is required with reference to claim 18, and further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see column 11, lines 17-22 – the intensities of the sub-pixels must be adjusted to create a uniform brightness and color).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 6, 7, 12, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murdoch et al. in view of Kumada et al. (US Patent No. 5,563,725).

With reference to claim 6, Murdoch et al. teaches all that is required with reference to claim 1, but fails to teach a combiner to combine the first and second intermediate sub-pixel data.

Kumada et al. teaches a conversion module comprising:

a first converter (52) to convert the image data representing pixels of said color image in terms of at least three data components into first intermediate sub-pixel data of said four or more colors (see Figure 2 and column 1, lines 49-52);

a second converter (54) to convert the image data representing pixels of said color image in terms of at least three data components into second intermediate sub-pixel data of three or more colors (see Figure 2, and column 1, lines 49-52); and

a combiner (56) to combine said first and second intermediate sub-pixel data into said converted sub-pixel data (see Figure 2 and column 1, lines 52-56),

wherein said controller is able to control at least one of said first and second converters and said combiner based on at least one of said display attributes and image attributes (see column 1, lines 42-56).

It would have been obvious to one of ordinary skill in the art at the time of invention to use two converting circuits to convert the RGB data to four-color data such that each converter is designed to carry out a specific task; in this case, one converter is used to modify the data format, while the other is then able to match the format of the

data with the properties which the data would need to possess in order to be properly displayed. This simplifies the construction of the converters and can increase processing speed.

With reference to claim 7, Murdoch et al. and Kumada et al. teach all that is required with reference to claim 6, and Murdoch et al. further teaches that said second converter is able to convert the image data representing pixels of said color image in terms of at least three data components using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see column 11, lines 11-32 and column 6, line 25 to column 7, line 40).

With reference to claim 12, Murdoch et al. teaches all that is required with reference to claim 1, but fails to teach a memory.

Kumada et al. teaches a memory to store display-related data representing said one or more display attributes (see column 6, lines 35-39).

It would have been obvious to one of ordinary skill in the art at the time of invention to store display attributes in a memory such that they can easily and repeatedly be accessed as necessary to convert the incoming data.

With reference to claim 22, Murdoch et al. teaches all that is required with reference to claim 17, but fails to teach combining the first and second intermediate sub-pixel data.

Kumada et al. teaches that converting said image data comprises:

converting the image data representing pixels of said color image in terms of at least three data components into first intermediate sub-pixel data of said at least four primary colors (see Figure 2 and column 1, lines 46-49);

converting the image data representing pixels of said color image in terms of at least three data components into second intermediate sub-pixel data of at least three primary colors (see Figure 2 and column 1, lines 49-52);

combining said first and second intermediate sub-pixel data into said converted sub-pixel data (see Figure 2 and column 1, lines 52-56); and

controlling at least one of converting said image data into said first intermediate sub-pixel data, converting said image data into said second intermediate sub-pixel data, and said combining, based on at least one of said display attributes and said image attributes (see column 1, lines 42-56).

It would have been obvious to one of ordinary skill in the art at the time of invention to carry out two conversions to convert the RGB data to four-color data such that each converter is designed to carry out a specific task; in this case, one converter is used to modify the data format, while the other is then able to match the format of the data with the properties which the data would need to possess in order to be properly displayed. This simplifies the construction of the converters and can increase processing speed.

With reference to claim 23, Murdoch et al. and Kumada et al. teach all that is required with reference to claim 22, and Murdoch et al. further teaches that converting said image data into said second intermediate sub-pixel data comprises converting said

image data using at least one conversion matrix, which is based on at least one of said display attributes and said image attributes (see column 11, lines 11-32 and column 6, line 25 to column 7, line 40).

9. Claims 9 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murdoch et al. in view of Inoue (US Patent No. 5,896,178).

With reference to claim 9, Murdoch et al. teaches all that is required with reference to claim 1, but fails to teach that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data.

Inoue teaches that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data (see column 8, lines 21-24).

It would have been obvious to one of ordinary skill in the art at the time of invention to base the conversion factors on the timing of the display signal such that the modified data is still displayed for the intended amount of time. The need for this becomes even further obvious when the display signal is a dynamic video signal.

With reference to claim 25, Murdoch et al. teaches all that is required with reference to claim 17, but fails to teach determining one or more values of said conversion matrix based on one or more timing signals related to said image data.

Inoue teaches that said controller is able to determine one or more values of said conversion matrix based on one or more timing signals related to said image data (see column 8, lines 21-24).

It would have been obvious to one of ordinary skill in the art at the time of invention to base the conversion factors on the timing of the display signal such that the modified data is still displayed for the intended amount of time. The need for this becomes even further obvious when the display signal is a dynamic video signal.

10. Claims 11, 15, 16, 18, 27, 30, 32, 36, and 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murdoch et al. in view of Lee (US Patent No. 7,365,722).

With reference to claim 11, Murdoch et al. teaches all that is required with reference to claim 10, but fails to teach an interface module to generate driver signals.

Lee teaches an interface module (600) to generate said driver signals based on said sub-pixel data (see column 10, lines 38-45).

It would have been obvious to one of ordinary skill in the art at the time of invention that driver signals are required to control the image data being generated by Murdoch and applied to a display, such that if the method taught by Murdoch was applied to a display (i.e. the display taught by Lee), driver signals would inherently be required to ensure that the converted data is applied properly to the display device.

With reference to claim 15, Murdoch et al. teaches all that is required with reference to claim 1, but fails to explicitly teach a display panel.

Lee teaches a display panel containing said driver control module and said array of sub-pixel elements (see column 5, lines 5-10).

It would have been obvious to one of ordinary skill in the art at the time of invention that the method that Murdoch teaches is for use with a display panel, such

that the method taught by Murdoch could be carried out in any suitable display panel, such as that taught by Lee.

With reference to claim 16, Murdoch et al. teaches all that is required with reference to claim 1, but fails to teach that said array of sub-pixel elements comprises an array of liquid crystal elements.

Lee teaches that said array of sub-pixel elements comprises an array of liquid crystal elements (see column 5, line 5).

It would have been obvious to one of ordinary skill in the art at the time of invention that the method that Murdoch teaches is for use with a display panel, such that the method taught by Murdoch could be carried out in any suitable display panel, such as that taught by Lee.

With reference to claim 18, Murdoch et al. teaches all that is required with reference to claim 17, and further teaches generating display signals based on one or more display attributes and one or more image attributes (see column 11, lines 11-32), but fails to teach generating driver signals for activating drivers.

Lee teaches generating one or more driver signals for activating said drivers (see column 10, lines 38-45).

It would have been obvious to one of ordinary skill in the art at the time of invention that driver signals are required to control the image data being generated by Murdoch and applied to a display, such that if the method taught by Murdoch was applied to a display (i.e. the display taught by Lee), driver signals would inherently be required to ensure that the converted data is applied properly to the display device.

With reference to claim 27, Murdoch et al. teaches all that is required with reference to claim 26, but fails to teach generating said driver signals based on said sub-pixel data signal.

Lee teaches generating said driver signals based on said sub-pixel data signal (see column 10, lines 38-45).

It would have been obvious to one of ordinary skill in the art at the time of invention that driver signals are required to control the image data being generated by Murdoch and applied to a display, such that if the method taught by Murdoch was applied to a display (i.e. the display taught by Lee), driver signals would inherently be required to ensure that the converted data is applied properly to the display device.

With reference to claim 30, Murdoch et al. teaches a color display system for displaying a more-than-three color image, the system comprising:

an input interface to generate image data signals representing pixels of said color image in terms of at least three data components (see column 11, lines 11-17); and

a driver control module to generate sub-pixel data signals of at least four different colors, based on said image data signals, wherein said driver control module is able to generate said signals based on one or more position-dependent display attributes independently related to individual positions in said display device and one or more image attributes related to said color image (see column 11, lines 11-32 and column 6, line 25 to column 7, line 40).

Murdoch et al. fails to teach generating driver signals for activating said drivers.

Lee teaches generating said driver signals based on said sub-pixel data signals (see column 10, lines 38-45).

It would have been obvious to one of ordinary skill in the art at the time of invention that driver signals are required to control the image data being generated by Murdoch and applied to a display, such that if the method taught by Murdoch was applied to a display (i.e. the display taught by Lee), driver signals would inherently be required to ensure that the converted data is applied properly to the display device.

With reference to claim 32, Murdoch et al. and Lee teach all that is required with reference to claim 30, and Murdoch et al. further teaches:

a conversion module to convert said image data signals into converted sub-pixel data signals representing said color image in terms of four or more colors (see column 11, lines 11-17); and

a controller to control said conversion module to convert said image data signals based on said one or more display-attributes and said one or more image-attributes, wherein data for each of said four or more primary colors of said converted sub-pixel data is in gray-level format (see column 11, lines 17-32).

Murdoch et al. fails to explicitly teach the structures used to carry out the method of data conversion, but inherently teaches a conversion module which carries out the described conversion, and also a controller, which is well known in the art as being used to control data generating and driving circuitry.

With reference to claim 36, Murdoch et al. and Lee teach all that is required with reference to claim 32, and Murdoch et al. further teaches that said driver control module

comprises a sub-pixel processor to process said converted sub-pixel data signals, wherein said controller is able to control said processor to generate a sub-pixel signal based on at least one of said image attributes and said display attributes (see column 11, lines 11-32 – it is inherently known that processors are used to carry out data processing functions, such that Murdoch would inherently comprise a sub-pixel processor).

With reference to claim 38, Murdoch et al. and Lee teach all that is required with reference to claim 30, and Murdoch et al. further teaches that said one or more display-attributes comprise at least one attribute selected from the group consisting of a configuration of one or more defective sub-pixel elements within said array, a brightness non-homogeneity of said display device, and a color non-homogeneity of said display device (see column 11, lines 23-32 – the spatial arrangement of the sub-pixels must be compensated for to eliminate brightness or color non-homogeneity).

With reference to claim 39, Murdoch et al. and Lee teach all that is required with reference to claim 30, and Murdoch et al. further teaches that said one or more image-attributes comprise one or more attributes selected from the group consisting of a perceived bit-depth of pixels of at least part of said image, a viewed smoothness of at least part of said image, a brightness uniformity of at least part of said image, a color uniformity of at least part of said image, and a rendering scheme to be applied to at least part of said image (see column 11, lines 17-22 – the intensities of the sub-pixels must be adjusted to create a uniform brightness and color).

With reference to claim 40, Murdoch et al. and Lee teach all that is required with reference to claim 30, and Lee further teaches a display panel containing said driver control module and said array of sub-pixel elements (see column 5, lines 5-10).

Response to Arguments

11. Applicant's arguments with respect to claims 1, 6, 7, 9-18, 22, 23, 25-30, 32, 36, and 38-40 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ILANA SPAR whose telephone number is (571)270-7537. The examiner can normally be reached on Monday-Thursday 8:00-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (571)272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bipin Shalwala/
Supervisory Patent Examiner, Art Unit 2629

ILS